at a proximal end of the sampling cannula and reduced pressure or other extraction methods is applied within a volume of the sampling cannula to draw liquid samples from the adjacent environment into the volume through the ports exposed to the adjacent environment.

A method of sampling liquids from within a patient may have steps of:

a) inserting a sampling device into a region of a patient, the sampling device comprising a delivery catheter and sampling cannula located within a lumen of the delivery catheter and having a longitudinal axis, the delivery catheter being moveable over the sampling cannula by retraction or extension of the delivery catheter;

b) moving the delivery catheter towards a target volume of the patient causing a retraction of the delivery catheter, thereby exposing the sampling cannula to the target volume of the patient;

c) allowing liquid within the target volume of the patient into the sampling cannula; and

d) withdrawing the liquid from the sampling cannula to create a liquid sample.

The sampling cannula may be inserted through the skin or other barrier into a target area within the patient, the sampling cannula is positioned at a forward location within the patient, the delivery catheter is withdrawn from the forward location and the sampling cannula remains at the forward location.

A support element within the sampling device may support a proximal end of the sampling cannula so as to resist withdrawal from the forward location by any friction between the delivery catheter and the sampling cannula.

The sampling cannula may have at least one liquid inflow port along its longitudinal axis and movement of the delivery catheter away from the target area increases exposure of the at least one delivery port to liquid within the target area of the patient.

In the method there may be multiple liquid inflow ports along the longitudinal axis of the sampling cannula and movement of the delivery catheter away from the target area increases exposure of the multiple delivery ports to liquid within the target area of the patient and then liquid is drawn into the sampling cannula through the multiple delivery ports.

In method, the sampling cannula may support a sampling hub that surrounds a front end of the sampling cannula, the sampling hub providing a sealed insertion port physically insulating the sampling cannula from liquid in the target area within the patient, and the sampling hub covers the sampling cannula before the liquid is withdrawn. In this type of method, the retraction of the delivery catheter may simultaneously cause the sampling hub to cover the sampling cannula and upon full insertion exposes the sampling cannula to liquid within the target area of the patient.

Although specific materials, dimensions and designs have been provided to enable practice of the present technology, this specific disclosure is to be understood as support for the generic concepts recited herein and are not intended to limit the generic scope of the claims. Variations, equivalents and alternatives to the specifics will be understood by those skilled in the art in this light.

The invention claimed is:

1. A method of sampling liquids from within a patient comprising:

a) inserting a sampling device into a region within a patient, the sampling device comprising a delivery catheter and sampling cannula located within a lumen of the delivery catheter and having a longitudinal axis, the delivery catheter being moveable over the sampling cannula by retraction or extension of the delivery catheter;

b) moving the sampling cannula towards a target volume of the patient causing a retraction of the delivery catheter relative to the sampling cannula, thereby exposing the sampling cannula to the target volume of the patient; and

c) allowing liquid within the target volume of the patient into the sampling cannula;

wherein inserting the sampling device comprises (i) transitioning a proximal valve of a sampling hub from a closed state to an open state by inserting a distal end of the delivery catheter and the sampling cannula at least partially through the proximal valve and (ii) inserting the sampling cannula through a distal valve and distal end of the sampling hub while the distal end of the delivery catheter remains proximal to the distal valve;

wherein inserting the sampling device further comprises positioning the sampling cannula and the delivery catheter to be entirely proximal to the sampling hub while the sampling cannula is located within the lumen of the delivery catheter.

2. The method of claim **1** wherein the sampling cannula is inserted into a target area at a forward location within the patient, and the delivery catheter is withdrawn while the sampling cannula remains at the forward location.

3. The method of claim **2** wherein a support element within the sampling device supports a proximal end of the sampling cannula so as to resist withdrawal from the forward location by any friction between the delivery catheter and the sampling cannula.

4. The method of claim **3** wherein the sampling cannula comprises multiple inflow ports along the longitudinal axis of the sampling cannula, movement of the delivery catheter away from the target area increases exposure of the multiple inflow ports to liquid within the target area of the patient, and liquid is drawn into the sampling cannula through the multiple inflow ports.

5. The method of claim **4** wherein the retraction of the delivery catheter simultaneously causes the sampling hub to cover the sampling cannula and upon full insertion exposes the sampling cannula to liquid within the target area of the patient.

6. The method of claim **2** wherein the sampling cannula has at least one inflow port along its longitudinal axis and movement of the delivery catheter away from the target area increases exposure of the at least one inflow port to liquid within the target area of the patient.

7. The method of claim **2** wherein the sampling cannula supports the sampling hub that surrounds a front end of the sampling cannula, the sampling hub providing a sealed insertion port physically insulating the sampling cannula from liquid in the target area within the patient, and the sampling hub covers the sampling cannula before the liquid is withdrawn.

8. The method of claim **1** wherein the sampling cannula is inserted through the sampling hub into a target area at a forward location within the patient, and the delivery catheter is withdrawn while the sampling cannula remains at the forward location.

9. The method of claim **1** further comprising inserting a distal end of the sampling cannula through a distal valve of the hub.

10. The method of claim **9** wherein the distal valve is positioned at the region within the patient.

11. The method of claim **9** wherein the distal valve is a distal septum.

12. The method of claim **1** wherein moving the delivery catheter further comprises advancing the delivery catheter through a proximal chamber of the hub, distal to the proximal